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AUTHOR Bolton, Cynthia; And Others
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ABSTRACT

Among the repertoire of clinical skills necessary for the professional development of medical students is the ability to create a positive doctor-patient relationship through effective communication skills. The purpose of this study was to create an instrument that reliably measures the relationship between physician and patient. The Relationship Instrument provides evidence to document both medical student's task and socio-emotional behaviors as well as the socio-emotional behaviors of the patients whom they interview. Specifically measured were indicators of this relationship between third year medical students taking a clinical performance examination and standardized patients. Subjects (n=370) included all third year medical students at four medical schools in North Carolina. The Relationship Instrument is a 15-item checklist that was completed by a standardized patient in each of 20 cases. Exploratory factor analysis did identify a two factor model that used 13 of the original 15 items and indicated that scores derived from the Relationship Instrument correspond to the two dimensions used to construct it. Factor scores on the instrument were reliable. Thus, evidence suggests that measurements derived from the Relationship Instrument are consistent with interpretation of the two components of the doctor-patient relationship. A copy of the instrument is included. (JBJ)

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Relationship Skills in a Clinical Performance Examination: Reliability and Validity of the Relationship Instrument

Cynthia Bolton, Donna Harward, Allen Smith,
Gwendie Camp, Emil Petrusa, Boyd Richards, Steve Willis

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Relationship Skills in a Clinical Performance Examination:
Reliability and Validity of the Relationship Instrument

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Introduction

Among the repertoire of clinical skills necessary for the professional development of medical students preparing to become physicians is the ability to create a positive doctor-patient relationship through effective communication and interpersonal skills. It has been argued that the skills which facilitate the doctor-patient relationship build the necessary bonds of understanding which both the physician and patient require in order to work toward greater health of the patient (Korsch & Negrete, 1972; Davis, 1971; Korsch, et al, 1968). Furthermore, a productive and satisfying doctor-patient relationship results in improved communication, an increase in patient compliance, attentiveness, and in an improved patient perceived professional demeanor (Barrows, 1992; Hall, et al, 1988a). Although some communication skills can be thought of as case specific, because different communication skills may be required for different patients in different contexts, an argument has been made for the existence of generic relationship skills which can promote patients' understanding of and eventually their participation in behaviors that will improve their health status (Bolton, 1994). The Relationship Instrument was developed to provide evidence to document both the medical student's task and socio-emotional behaviors as well as the socio-emotional behaviors of the patients whom they interview.

Design

The purpose of this study was to create an instrument that reliably measures the relationship between physician and patient. The Relationship Instrument was designed specifically to measure indicators of this relationship between third year medical students taking a clinical performance examination (CPX) and standardized patients (SPs). Confidentiality was maintained by assigning students a test number in which scores on the measures were recorded.

The data were collected during the summer and early fall of 1993. The CPX is a two-day twenty-station SP-based standardized examination of clinical skills. The exam assesses the "clinical skills" of the students using medical simulations. Research studies have reported performance based examinations of clinical skills with standardized patients as a reliable and valid method of assessing the clinical skills of medical students (Hardin, et al., 1975, Van der Vleuten & Swanson, 1990; Vu, et al, 1992). Because this study was nested in a larger research project investigating the development and implementation of the CPX, permission to conduct the study was granted by each medical school, the NCMSC, and test administrators.

The design of this study was developed to investigate the following research hypotheses:

1. An exploratory factor analysis will indicate that the scores derived from the Relationship Instrument reflect a factor structure that corresponds to the two domains used to construct the instrument.

2. An internal consistency reliability analysis using Cronbach's alpha will indicate that the reliability of each factor measured by the Instrument will be greater than .70.

Subjects and Setting

This study analyzed data collected during the initial implementation of the CPX at the four medical schools in North Carolina: Bowman Gray School of Medicine, Duke University, East Carolina University, and The University of North Carolina at Chapel Hill, which comprise the North Carolina Medical Schools Consortium (NCMSC). The NCMSC was created to develop, implement and evaluate innovative educational projects for teaching and evaluating medical students.

The subjects for this study included all third year medical students at the four medical schools who had completed the majority of their third year, and their clinical clerkships including Internal Medicine, Surgery, Obstetrics and Gynecology, and Pediatrics (with the exception of Site 3, where students finish clerkships after the second year).

The data for this study was based on 370 third year medical students from four medical schools provided by the NCMSC. The total number of students at the four sites was 440, but 70 were absent or excused because of unavailability (i.e. out of the state or country), illness, or incompletion of third year clerkships (i.e. part-time students). The available sample consisted of 60% males and 40% females. Eighty point five percent of the students were Caucasian, 9% were Asian, 8.6% were African American, 3% were Native American, and 3% were Hispanic or "Other". Three out of the four schools participating provided birth year information. Thirty-seven percent of the students for whom age data were available were between the ages of 24-26, and 36.5% were 27 years of age or older. The birth year data were missing for 26.5% of the students. (See Table 1).

Table 1: Sample Frequency Distribution by Gender, Race, and Age

		Frequency	Percent
Gender	Male	221	59.7
	Female	149	40.3
	Total	370	100
Race	Caucasian	298	80.5
	African American	32	8.6
	Asian	34	9.2
	Other	6	1.7
	Total	370	100
Age	24-26 years old	137	50.4
	27 and older	135	36.5
	Missing	98	13.1
	Total	370	100

Instrumentation

The Relationship Instrument is a 15 item checklist that was completed by the corresponding SP in each of the twenty cases. The SP had limited time (sometimes less than 5 minutes) in which to complete the Relationship Instrument along with other CPX instruments, therefore minimizing the number of items that could be included. Since SPs were recruited from the general public at large, and not necessarily from a medical population, the language used on the instrument was designed to be easily understood and usable by a large population of SPs with minimum training. The instrument requires SPs to read each item and respond on a four point rating scale how much the SP agrees or disagrees with the specific item descriptions of the encounter. For the purpose of this study the following scoring schema was used: 1= Strongly Agree; 2 = Agree; 3 = Disagree; 4= Strongly Disagree.

The Relationship Instrument was developed by a panel of educational and medical experts who wrote the items for the instrument based on clinical and assessment experiences and a review of the literature on doctor-patient relationships. The construction of the Relationship Instrument was theoretically based on research conducted by Hall, et al, (1988b). In this meta-analysis of doctor-patient interactions, physician behaviors were separated into two domains: **task and**

socio-emotional behaviors. The ability to measure behaviors which effect patient behavior is a strong step forward in medical education, particularly clinical assessment, since studies have shown correlations between physician behaviors and patient task behaviors such as compliance and recall (Hall, et al, 1987; Bartlett, et al, 1977), and socio-emotional behaviors such as satisfaction (Hall, et al, 1988a; Shortell, et al, 1977).

After reviewing the literature, 28 behavioral indicators of interpersonal/relationship skills and 37 communication/patient education indicators were listed. From this list, 24 items (14 relationship, 10 communication) were selected and then reviewed by the panel and reduced again to 22 (10 relationship, 12 communication). After items were further revised, the Relationship Instrument was reviewed by the Test Committee who revised some items and reduced the final number to 15: 8 Socio-Emotional items and 7 communication items. An example of a Socio-Emotional item is Item 1 "The student physician appeared empathetic (seemed sensitive, understood my problems, etc.)". An example of an item representing communication task behaviors is Item 10, "The student physician summarized what I said." (See Appendix for complete Relationship Instrument).

The data were analyzed to provide evidence for the reliability and validity of the scores obtained from the Relaitonship Instrument. The analyses completed for this study included factor analysis and reliability estimates.

Item Screening

An initial screening of the item scores indicated that the assumptions of normality were within satisfactory limits. Item means, standard deviations, skewness and kurtosis are listed in Table 2.

Table 2: Descriptive Statistics for Relationship Instrument Items Used in Analyses

Item	Mean	Standard Deviation	Skewness	Kurtosis
1	1.588	.678	.950	.612
2	1.505	.586	.866	.769
3	1.549	.641	.901	.442
4	1.674	.689	.721	.104
5	1.656	.678	.738	.174
6	1.640	.671	.766	.273
7	1.640	.653	.753	.487
8	1.777	.782	.683	-.257
9	1.749	.693	.544	-.190
10	1.923	.783	.454	-.419
11	1.603	.645	.855	.798
12	1.705	.703	.695	.058
13	1.990	.791	.362	-.515
14	1.965	.813	.437	-.500
15	1.994	.804	.284	-.763
Average Total Score	25.87	8.21		

*Item Score Range: 1=Strongly Agree, 2=Agree, 3=Disagree, 4=Strongly Disagree

Exploratory Factor Analysis

Exploratory factor analytic procedures utilizing principal axis method with an oblique rotation were used to determine the number and nature of the underlying constructs of these items. The correlational matrix for the principal components analysis revealed no variables with correlations of <.3 indicating that there was at least 10% shared variance among factors and warranted an oblique rotation (Tabachnick & Fidell, 1989). Another test of the factorability of the data was provided by the Kaiser-Meyer-Olken (KMO) measure of sampling adequacy. A value of .6 or higher is required for a good factor analysis (Kaiser, 1974). The KMO for this data was .965, which indicated that this sample was satisfactory for common factor analysis. Furthermore, an examination of the residuals in the reproduced correlation matrix revealed that the residuals were small and did in fact adequately explain the data since small residuals indicate a close fit between observed and reproduced matrices (Table 3).

Reproduced Correlation Matrix on Lower Triangle, Residuals on the Upper Triangle, and Communalities on the Main Diagonal

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.712*	-.015	-.002	-.027	-.062	-.074	-.075	-.018	-.021	-.000	-.033	-.0037	.019	.037	.034
2	.678	.648*	-.009	-.058	-.067	-.074	-.061	-.077	-.037	.041	.000	-.018	.039	.023	.006
3	.718	.683	.727*	-.036	-.065	-.059	-.062	-.053	-.005	.025	.006	-.034	.014	.011	.002
4	.723	.688	.731	.736*	-.010	-.051	-.026	-.029	-.009	.005	-.039	-.029	.007	.024	.008
5	.683	.645	.696	.701	.684*	-.015	-.041	.050	-.035	-.026	-.063	.055	-.018	.007	-.051
6	.709	.672	.719	.725	.698	.717*	.055	-.026	-.031	-.019	.010	-.010	-.007	.005	.002
7	.722	.687	.731	.735	.700	.724	.735*	-.031	-.022	.008	-.008	-.036	.004	.107	.014
8	.693	.654	.706	.711	.695	.708	.710	.705*	-.023	-.028	-.075	.009	-.004	.003	-.021
9	.632	.590	.650	.655	.659	.661	.654	.670	.660*	.002	-.039	-.026	-.046	-.041	-.023
10	.466	.422	.491	.495	.5641	.519	.493	.550	.589	.618*	-.053	-.068	-.023	-.0118	-.112
11	.544	.506	.561	.565	.576	.574	.564	.585	.585	.537	.520*	-.039	-.043	-.060	-.008
12	.569	.527	.589	.594	.613	.607	.592	.623	.630	.595	.564	.614*	-.021	-.606	-.084
13	.470	.423	.500	.504	.562	.534	.502	.572	.624	.676	.572	.638	.743*	-.081	-.106
14	.419	.373	.450	.454	.519	.487	.452	.529	.590	.662	.545	612	.733	.727*	-.029
15	.479	.436	.504	.508	.551	.531	.507	.561	.597	.618	.543	.600	.675	.660	.620*

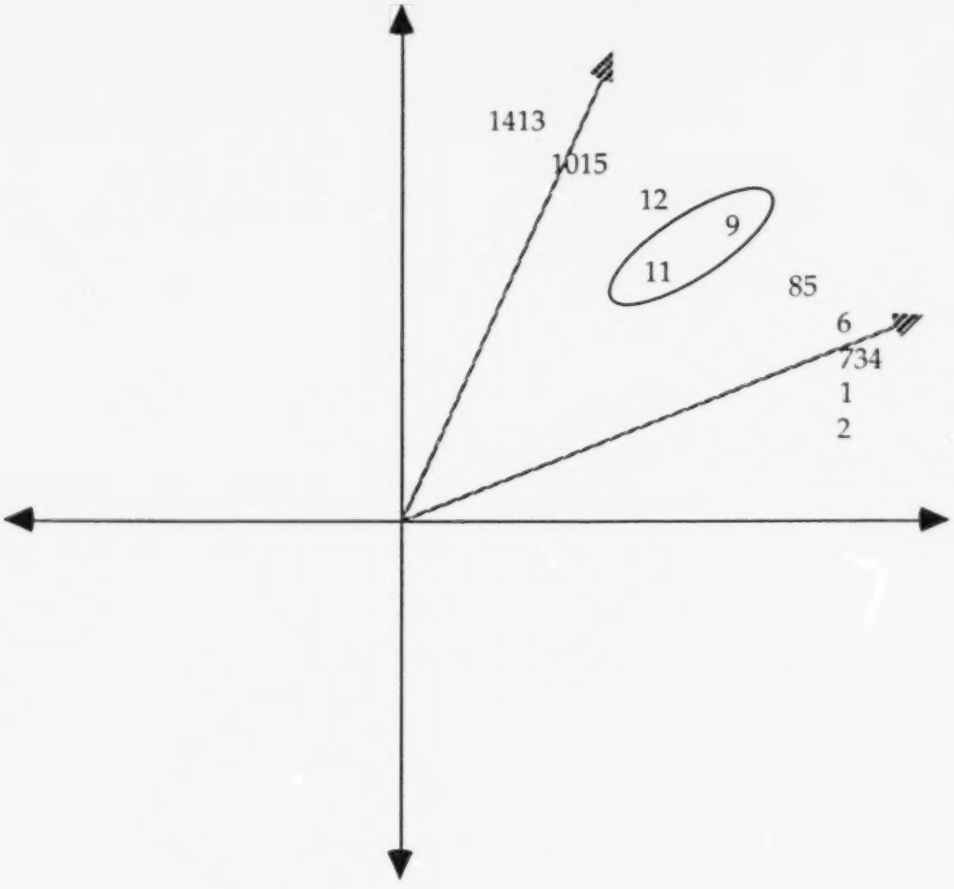
Eigen values derived from the principal components analysis produced two factors with eigen values exceeding one (eigen values less than one are usually not important to the variance of the factor). A two factor solution and a three factor solution were used to rotate the items using an oblique rotation procedure.

The two factor solution was the clearest and most parsimonious. The results of the oblique rotation revealed a clear picture of the nature of the variables (only one item did not load on either factor). Using a cut off of .45 for inclusion of a variable on a factor since "[t]he greater the loading, the more the variable is a pure measure of the factor" (Tabachnick & Fidell, 1989), the results indicated that all the items loading on Factor 1 were the same items that were originally proposed to measure Socio-Emotional Behaviors. The highest loading item on Factor 1 was Item 7: "As a patient, I felt safe in expressing myself and describing my situation." The items that loaded most strongly on the Socio-Emotional factor were those designed to reflect the interpersonal skills which take into account the patient's social and emotional well being.

The items loading on Factor 2 were the same items that were originally proposed to measure Communication Task Behaviors. These behaviors are intended to clarify and educate specific concerns to the patient. For example, Item 13 which loaded the highest on Factor 2 states: "The student physician checked my understanding of what s/he said."

An examination of the rotated pattern revealed two factors that were moderately correlated (.764) (see Figure 1 for a graph of the factor analysis with item coordinates). There was one borderline item (Item 9) that loaded .489 on Factor 1 and .356 on Factor 2, and one item (Item 11) which failed to load on either factor (loaded .387 on Factor 1 and .349 on Factor 2). Further examination of these two items revealed that these two items were double worded items, and included the conjunction "and". Therefore, these two items were dropped for all remaining analysis. Table 4 reports the factor structure of the Relationship Instrument and the

loading of each item as well as the eigen values. Table 5 lists the original items and the revised classification of items on the instrument based on the exploratory factor analysis. Thus, the two factors identified in the exploratory factor analysis seem to match the constructs that were originally proposed.



Item	Coordinates		Item	Coordinates	
1	.79224	.28967	9	.59657	.55140
2	.76832	.24028	10	.32651	.71486
3	.78691	.32775	11	.49417	.52540
4	.79145	.33137	12	.49695	.60564
5	.70340	.43546	13	.29857	.71486
6	.75587	.38148	14	.22978	.82138
7	.79145	.32906	15	.34680	.70678
8	.71278	.44454			

Figure 1: Factor Analysis Graph of Item Coordinates

Table 4: Relationship Instrument Item Factor Loadings

	Extracted		Rotated	
Item	Factor 1	Factor 2	Factor 1	Factor 2
1	.797	-.276	.857	-.057
2	.741	-.299	.808	-.066
3	.817	-.244	.844	-.018
4	.823	-.244	.855	-.022
5	.820	-.107	.671	.170
6	.827	-.183	.780	.063
7	.821	-.246	.859	-.028
8	.833	-.106	.685	.173
9	.810	.049	.489	.356
10	.705	.347	.120	.633
11	.715	.094	.387	.349
12	.768	.155	.342	.465
13	.743	.438	-.036	.859
14	.697	.491	-.086	.858
15	.716	.238	.152	.611
Percent of Variance	60.5	7.3	58.0	4.9
Eigen Values	9.068	1.098		

Table 5: Proposed and Revised Classification of Relationship Instrument Items

Proposed Classification of Items on the Relationship Instrument

Category	Items
Socio-Emotional Behaviors	1, 2, 3, 4, 5, 6, 7, 8
Communication Task Behaviors	9, 10, 11, 12, 13, 14, 15

Revised Classification of Items on Relationship Instrument Based on Exploratory Factor Analysis *

Category	Items
Socio-Emotional Behaviors	1, 2, 3, 4, 5, 6, 7, 8
Communication Task Behaviors	10, 12, 13, 14, 15

* Includes Only Items Loading .45 or Higher for the 2 Factor Solution

Internal Consistency Reliability Estimates

Three different internal consistency reliability estimates were calculated in this investigation since the Relationship Instrument can be used and interpreted in a number of different ways in the context of performance assessment. Cronbach's coefficient alpha was used in each analysis. For the first design, the internal consistency reliability estimates are computed for the scores which are based on the ratings each student received on each of the two factors of the Relationship Instrument in twenty different medical contexts (cases) with a different trained observer for each case (n=7821). Students who were not rated (i.e. missing values) on one or more items for that particular dimension were deleted from the analysis (Factor 1: n = 6702; Factor 2: n = 6758). The scores were totaled on each factor by adding the ratings across item occurrences. The internal consistency reliability estimates for this model were .94 for the Socio-Emotional Behavior factor and .87 for the Communication Task Behaviors factor (Table 6).

The second design averaged item scores for each factor for each student across the twenty different medical contexts (cases) and then computed an alpha coefficient for these two averaged factor scores (n = 370). Averaged factor scores were obtained by computing the mean factor score for each student. Using this model the internal consistency reliability estimate for Socio-Emotional Behaviors was .98; Communication Task Behaviors, .94 (Table 7).

The third design calculated separate reliability estimates for each item across the twenty medical cases. This statistic was computed since it may be of interest to know how consistently each item operates across very diverse medical contexts (cases) during the performance examination. In other words, this analyses computed how stable each item was given the diverse nature of the cases (e.g. emergency room, doctor's office, hospital room) with different patient attributes (e.g. age, race, gender, socio-economic status) presenting with a variety of complaints. Using this model, item coefficient alpha estimates ranged from .51 to .73 (Table 8).

Table 6: Internal Consistency Reliability Estimates Design 1: All Occurrences

Relationship Instrument Using All 15 Items

Scale	# of Items	Reliability
Total	15	.95

Revised Instrument

Scale	# of Items	Reliability
Socio-Emotional Behaviors	8	.94
Communication Task Behaviors	5	.87

Table 7: Internal Consistency Reliability Estimates Design 2: Average Occurrences

Scale	# of Items	Reliability
Socio-Emotional Behaviors	8	.98
Communication Task Behaviors	5	.94

Table 8: Internal Consistency Reliability Estimates Design 3: Item Estimates Across Cases

Scale	Item	Reliability
Socio-Emotional Behaviors	1	.73
	2	.51
	3	.62
	4	.67
	5	.66
	6	.59
	7	.60
	8	.71
Communication Task Behaviors	10	.60
	12	.66
	13	.60
	14	.61
	15	.64

Discussion

Instrumentation Structure

Exploratory factor analysis did identify a two factor model that used 13 of the original 15 items. An oblique rotation was used because it was believed that the factors defining the construct would be correlated. Analysis revealed that there was a moderate correlation of .74 between the two factors. Factor 1 was described as the Socio-Emotional Behaviors Scale. The items on this factor were most reflective of those skills which take into account the patient's social and emotional well being, as well as the resulting feelings of the patient due to the physician's skill. For example, Item 4 which loaded highly on factor 1 states "As a patient, I felt that the student physician understood me". Factor 2 was described as Communication Task Behaviors Scale. These items reflect the behaviors that facilitate the transmission of knowledge by engaging the patient in the relationship process. Item 14 which loaded highly on this factor states "The student physician helped me take an active role in my care".

Using a standard to retain an item that it must load on a factor $\geq .45$, one item failed to load on either factor, and another loaded on both. Both of these items contained the conjunction 'and' making them double worded items. These items were dropped from further analysis and should be dropped from the instrument or revised for future uses of the Clinical Performance Examination. These items could be revised into two separate items. Given the clarity of the factor loadings, it was concluded that the two factor structure derived from exploratory factor analysis could be interpreted as being closely related to what was intended when the instrument was constructed. The research hypothesis that an exploratory factor analysis will indicate that the scores derived from the Relationship Instrument corresponds to the two dimensions used to construct the instrument was supported.

Reliability

For both factors on the Relationship Instrument, the internal consistency reliability was higher than the .70 specified as the minimally accepted standard for using scales for group studies. The eight item Socio-Emotional Behaviors Scale had a reliability coefficient of .94, and the five item Comunication Task Behaviors Scale had a reliability coefficient of .87. Two other reliability estimates were calculated due to different possible uses and interpretations of the scores. When the item scores were averaged for each student across cases, the reliability coefficients increased on both scales: Socio-Emotional was .98 and Communication was .94. These findings support the research hypothesis that the factor scores on the Relationship Instrument were reliable.

Internal consistency estimates were also computed for each item on the instrument when used across cases. The resulting alpha coefficients were moderate in nature. These findings suggest that the scores for each item were stable when summed across cases. However, when examining the consistency of the items across cases, only two items exceeded the .70 minimum standard, although most of the remaining items were very near the minimally accepted standard. This result could be due to the diversity of contexts for each case, as well as patient attributes and presenting complaints. Items worded in more general terms did produce greater consistency across cases. For instance, Item 8 "As a patient, I felt that this encounter could be the beginning of a good doctor-patient relationship" can be easily generalized across cases, and produced a reliability consistency estimate of .71. Whereas, Item 2 "The student physician appeared respectful (used my name, used language I could understand without speaking down to me, etc.)" may not be as stable in an emergency situation in comparison to a routine examination. This item produced a consistency estimate of .51. Also, the two items with high reliabilities were ones that dealt directly with empathy and patient satisfaction (basic elements of socio-emotional behaviors) and therefore translate well across medical

contexts. The items on the Communication Task Behaviors Scale were all in the .60 to .66 range due to the specificity of the behaviors being meausred.

Recommendations

The evidence suggests that the measurements derived from the Relationship Instrument are consistent with the interpretation of the two components of the doctor-patient relationship. Analysis supports the continued use of the Relationship Instrument to measure Socio-Emotional Behaviors and Communication Skills of student physicians across 20 cases in a clinical performance examination; however, more research and training in conjuction with the Relationship Instrument is needed.

A confirmatory factor analysis study on the revised instrument should be used to cross validate the two factor model. Confirmatory factor analysis would allow researchers to test the extent to which data produced by the Relationship Instrument fits the hypothesized model and then to observe how closely that model can reproduce the observed data by comparing variance and covariance correlations.

Items that have double meanings should be avoided since they are ambiguous to raters. Likewise, raters need to be carefully trained to use the total range of the instrument's scale, since raters tended to underutilize the upper levels of the scale (Disagree, Strongly Disagree). This consideration is important since it may be a natural response for non-experts to rate all students as 'good' in order to avoid the uncomfortable feelings elicited from rating a student poorly. This response may hinder SPs from making true judgments and result in a failure to discriminate between students' skills. Thus, training the raters to use the entire range of the scales on the instrument will result in better discrimination between student physician behaviors. This is a critical factor in garnering reliable and valid data on this instrument.

Finally, further research is needed that more fully investigates the underlying construct(s) of the doctor-patient relationship. Specifically analyses of Relationship Instrument scores in regards to gender, race and age will add to the 'nomonolgical net' which may investigate the arguments for such a construct. Furthermore, it might be particularly useful to continue to examine how the gender, age, and race of the SP rater may interact with student variables in predicting scores since this is a possible threat to the validity of the exam.

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Appendix A

Relationship Instrument

Physician Name_____

Remember to:

Fill in ALL the blanks above, including the code bubbles.
Complete all items on the checklist--don't skip any!
For each item, darken one bubble per item using the given scale
Write comments below as desired.

Strongly Disagree
Disagree
Agree
Strongly Agree

THE STUDENT PHYSICIAN APPEARED...

empathetic (seemed sensitive, understood my problems, etc.)

respectful (used my name, used language I could understand without speaking down to me, etc.)

interested (listened to my story, followed up on my comments and questions, etc.)

AS A PATIENT, I FELT...

that the student physician understood me

that I would respect the advice the student physician gave me

comfortable asking for additional information or clarification

safe in expressing myself and describing my situation

that this encounter could be the beginning of a good doctor-patient relationship

THE STUDENT PHYSICIAN...

helped me explain my situation and clarify my concerns

summarized what I said

gave me opportunities to ask questions and make comments

provided clear information

checked my understanding of what s/he said

helped me take an active role in my care

asked about my needs and interests

WRITTEN COMMENTS: